REMARKS

Claims 1-9 are pending in this application. Claims 1 and 4-9 are withdrawn. By this Amendment, claims 2 and 3 are amended to overcome the claim objections. Withdrawn claims 1, 4-6 and 8 are amended for consistency. The paragraph beginning at page 2, line 26 of the specification is amended to correct a minor typographical error. The paragraph beginning at page 6, line 2 and the Abstract are amended for consistency regarding the amendments to formula (2) in claim 3. The amendments to formula (2) in claim 3, the Abstract and the paragraph beginning at page 6, line 2 are supported at least by Figure 1 of the present specification. No new matter is added by this Amendment.

I. Claim Objections

A. Claims 2 And 3

Claims 2 and 3 were objected to for reciting "a graft copolymer compound" and "the monomer compound." Although Applicant respectfully disagrees with the Patent Office's conclusion, claims 2 and 3 have been amended to recite "a graft copolymer" and "the monomer." Withdrawn claims 1, 4-6 and 8 have also been amended for consistency.

Withdrawal of the objection is requested.

B. Claim 3

Claims 3 was objected to regarding alleged informalities with formula (2) recited therein. As illustrated above, Applicant has amended formula (2) in claim 3 accordingly. Furthermore, as discussed above, Applicant has amended the specification and the Abstract for consistency.

Withdrawal of the objection is requested.

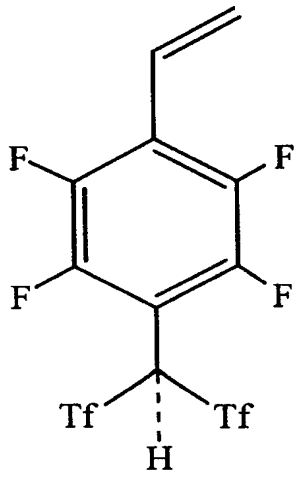
II. Rejection Under 35 U.S.C. §103(a)

The Patent Office rejected claims 2 and 3 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,828,386 ("MacKinnon") and/or U.S. Patent No. 6,359,019 ("Stone") in view of Angew. Chem., vol. 113, pp 4201-4203 (2001) ("Ishihara"), U.S. Patent No. 3,179,640 ("Middleton") and Journal of Fluorine Chem., Vol. 52, pp 301-306 (1991) ("Sprague"). Applicant respectfully traverses this rejection.

The Patent Office cites MacKinnon and/or Stone as allegedly disclosing substituted α, β, β-trifluorostyrenes radiation graft polymerized to poly(ethylene-co-tetrafluoroethylene). See MacKinnon, Abstract; column 2, lines 64-65; and column 3, lines 12-16; see also Stone, Abstract and column 6, lines 10-11. The Patent Office admits that MacKinnon and Stone fail to disclose (1) graft polymerizing a fluorostyrene before substitution ("Feature 1"), and (2) a non-fluorinated vinyl moiety in the styrene-based compound ("Feature 2"). See Office Action, page 7. The Patent Office thus introduces three references (Ishihara, Middleton and Sprague) and alleges that the combination of these three references describe Feature 1 and Feature 2. Applicant respectfully disagrees.

A. Claim 2

Claim 2 recites a graft copolymer in which a monomer represented by the general formula (1):



(1)

is graft-copolymerized to the main chain of a fluorine-containing hydrocarbon polymer, wherein Tf indicates a trifluoromethane sulfonyl group ($-SO_2CF_3$).

As discussed in the present specification, the inclusion of the graft copolymer of claim 2 within a polymer electrolyte permits the fuel cell to exhibit sufficient proton conductivity even in a low-water-content state or zero-water-content state. Furthermore, a fuel cell that includes the graft copolymer of claim 2 may exhibit increased system operation temperature and eliminate any need for a humidifier. See page 11, lines 24-28 of the present specification.

B. Ishihara, Middleton And Sprague

For the reasons discussed below, the combination of Ishihara, Middleton and Sprague do not remedy the deficiencies of MacKinnon and Stone.

The Patent Office cites Ishihara as allegedly disclosing a polystyrene-bound tetrafluorophenyl-bis(triflyl)-methane. See Office Action, page 7 (citing Ishihara, page 4201, column 1, line 25, formula 3). Although the Patent Office is silent regarding why Ishihara is referenced, Applicant presumes that it is due to the pentafluorophenylbis(triflyl)-methane disclosure in Ishihara. See Ishihara, column 1, lines 22-23.

However, the pentafluorophenylbis(triflyl)-methane is merely a precursor of the monomer compound of formula (1) recited in claim 2. See the illustration on page 8 of the specification. Ishihara thus does not disclose the monomer of formula (1), instead disclosing only a precursor of the monomer compound of formula (1). Ishihara therefore fails to remedy the deficiency of MacKinnon and Stone.

The Patent Office further cites Middleton as describing monomeric fluorine-substituted styrenes and polymers thereof. See Middleton, column 1, lines 11-14 and column 2, lines 52-55. Applicant presumes that this citation is intended to remedy the deficiency of MacKinnon and Stone (1) to describe non-fluorinated vinyl groups in the

fluorostyrenes and (2) to describe direct graft polymerization of a substituted fluorostyrene, instead of first polymerizing the fluorostyrene and then adding the substitution after polymerization, as is described in MacKinnon and Stone.

However, one of ordinary skill in the art would not have had any reason or rationale to have attempted to incorporate (a) the fluorostyrenes with non-fluorinated vinyl groups and (b) the direct graft polymerization of substituted fluorostyrenes of Middleton, into the compounds of MacKinnon and Stone.

Middleton describes the graft polymerization of mono-substituted styrenes, which are very different compounds than the substituted α, β, β-trifluorostyrenes allegedly described in MacKinnon and Stone. As such, one having ordinary skill in the art would not have been provided with any reason or rationale to have the combined the mono-substituted styrenes of Middle with the substituted α, β, β-trifluorostyrenes, allegedly described in MacKinnon and Stone, with a reasonable expectation of success.

Furthermore, even if one having ordinary skill in the art combined Middleton with MacKinnon and Stone, such a combination would not have resulted in the graft copolymer recited in claim 1. Compounds of formula (1) have five (5) electro-negative substitutions that inevitably affect the reactivity of the compound as compared to the mono-substituted styrenes of Middleton. In view of the difference in reactivity between the compound of formula (1) and the mono-substituted styrenes of Middleton, Middleton also does not describe the compound of formula (I) in claim 2. For this reason, Middleton (like Ishihara) does not describe the compound of formula (1) in claim 2.

The Office Action cites Sprague as allegedly providing a reason or rationale for one of ordinary skill in the art to have attempted to polymerize styrene-based compounds with

non-fluorinated vinyl groups because Sprague discloses that, in certain circumstances, specific α, β, β-trifluorostyrenes exhibit undesirable dimerization rather than addition polymerization. See Sprague, page 302, last paragraph.

Although Sprague describes that one specific type of α, β, β-trifluorostyrene may exhibit undesirable dimerization under specific conditions, MacKinnon and Stone clearly describe that styrene-based compounds with fluorinated vinyl groups successfully undergo graft copolymerization. As such, Sprague (describing that such fluorostyrenes result in undesirable dimerization) would not have provided one of ordinary skill in the art with any reason or rationale to have attempted to have altered the processes of MacKinnon and Stone. The Patent Office's allegation that one of ordinary skill in the art would allegedly have combined all five cited references (MacKinnon, Stone, Ishihara, Middleton and Sprague) to have achieved the graft copolymer of claims 2 and 3 is thus based on impermissible hindsight.

Withdrawal of the rejection is requested.

III. Rejoinder

In view of the foregoing amendments and arguments, Applicant respectfully requests that upon allowance of claims 2-3, claims 1 and 4-9 be rejoined with the present application and similarly allowed.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-9 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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JAO:JDT/hs

Attachment:
Clean Copy of Abstract

Date: March 1, 2010

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